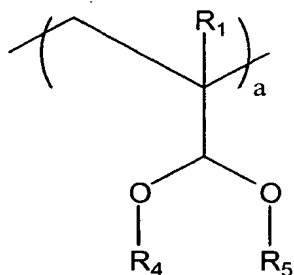


What is Claimed is:

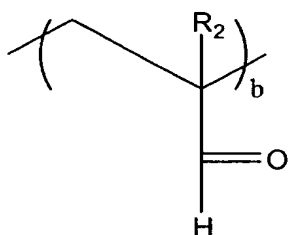
1. A photoresist polymer comprising a repeating unit of Formula 1, Formula 2 and Formula 3:

Formula 1

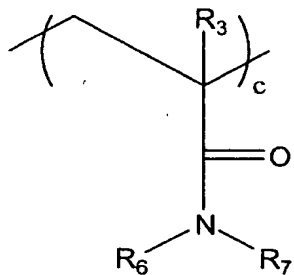


5

Formula 2



Formula 3



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wherein

R₁, R₂ and R₃ individually are hydrogen or methyl;

R₄, R₅, R₆ and R₇ individually are linear or branched C₁-C₁₀ alkyl;

a, b and c individually are numbers of repeating unit; and

15

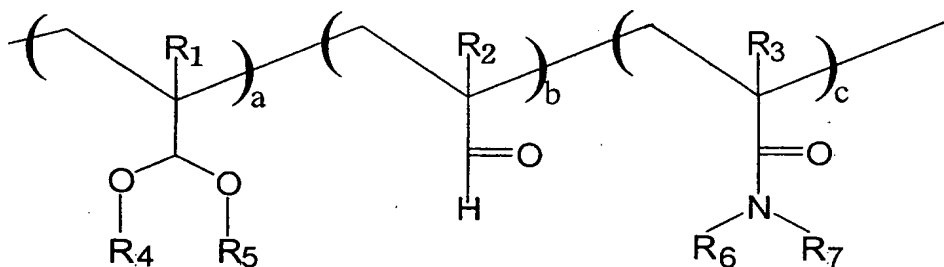
the relative ratio of a : b : c is in the range of 10~50mol% : 0~30mol%

: 50~80mol%.

2. The photoresist polymer according to claim 1, wherein the molecular weight of the photoresist polymer is 4000□40000.

3. The photoresist polymer according to claim 1, wherein the polymer comprises a repeating unit of Formula 4:

Formula 4



wherein

R₁, R₂ and R₃ individually are hydrogen or methyl;

R₄, R₅, R₆ and R₇ individually are linear or branched C₁-C₁₀ alkyl; and the relative ratio of a : b : c is in the range of 10~50mol% : 0~30mol% : 50~80mol%.

4. The photoresist polymer according to claim 3, wherein the repeating unit of Formula 4 is present in amount of at least 10wt% based on the total photoresist polymer.

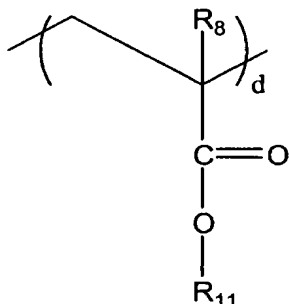
5. The photoresist polymer according to claim 3, wherein the repeating unit of Formula 4 is poly(N,N-dimethylacrylamide/3,3-dimethoxypropene/acrolein).

6. A photoresist composition comprising a photoresist polymer of claim 1 as a base resin, a photoacid generator and an organic solvent.

7. The photoresist composition according to claim 6, further comprising polyvinylphenol as a base resin.

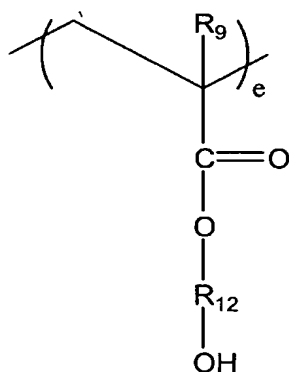
8. The photoresist composition according to claim 6, further comprising a second photoresist polymer including a repeating unit of Formula 5, Formula 6 and Formula 7 as a base resin:

Formula 5

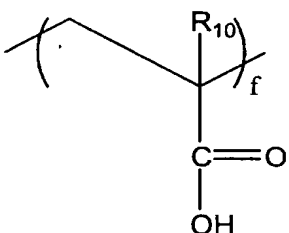


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Formula 6



Formula 7



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wherein

R_8 , R_9 and R_{10} individually are hydrogen or methyl;

R_{11} is linear or branched C_1 - C_{10} alkyl;

R_{12} is linear or branched C_1 - C_{10} alkylene;

15

d , e and f individually are numbers of repeating unit; and

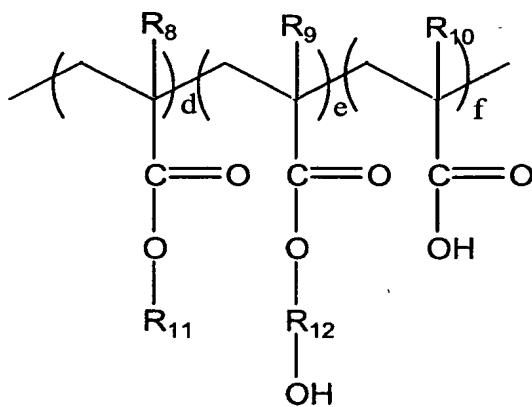
the relative ratio of $d : e : f$ is in the range of 10~70mol% : 10~50mol%

: 10~50mol%.

9. The photoresist polymer according to claim 8, wherein the molecular weight of the second photoresist polymer is 4000□40000.

10. The photoresist composition according to claim 8, wherein the second photoresist polymer comprises a repeating unit of Formula 8:

Formula 8



wherein

R₈, R₉ and R₁₀ individually are hydrogen or methyl;

10 R₁₁ is linear or branched C₁-C₁₀ alkyl;

R₁₂ is linear or branched C₁-C₁₀ alkylene; and

the relative ratio of d : e : f is in the range of 10~70mol% : 10~50mol% : 10~50mol%.

11. The photoresist polymer according to claim 10, wherein the repeating unit of Formula 8 is present in amount of at least 10wt% based on the total second photoresist polymer.

5 12. The photoresist composition according to claim 10, wherein the repeating unit of Formula 8 is selected from the group consisting of poly(methylmethacrylate/2-hydroxyethylmethacrylate/acrylic acid), poly(methylmethacrylate/ 2-hydroxypropylmethacrylate/acrylic acid), poly(ethylmethacrylate/2-hydroxypropylmethacrylate/acrylic acid) and
10 poly(ethylmethacrylate/2-hydroxyethylmethacrylate/acrylic acid).

13. The photoresist composition according to claim 6, wherein the photoresist composition comprises a photoresist polymer selected from the group consisting of blend polymer of poly(N,N-dimethylacrylamide/3,3-
15 dimethoxypropene/acrolein) and polyvinylphenol, blend polymer of poly(N,N-dimethylacrylamide/3,3-dimethoxypropene/acrolance) and poly(methylmethacrylate/2-hydroxyethylmethacrylate/acrylic acid), blend polymer of poly(N,N-dimethylacrylamide/3,3-dimethoxypropene/acrolein) and
20 poly(methylmethacrylate/2-hydroxypropylmethacrylate/acrylic acid), blend polymer of poly(N,N-dimethylacrylamide/3,3-dimethoxypropene/acrolein) and poly(ethylmethacrylate/2-hydroxypropylmethacrylate/acryl acid), blend polymer of poly(N,N-dimethylacrylamide/3,3-dimethoxypropene/acrolein) and poly(ethylmethacrylate/2-hydroxyethylmethacrylate/acrylic acid) and mixtures thereof as a base resin.

14. The photoresist composition according to claim 6, wherein the photoacid generator is one or more selected from the group consisting of diphenyl iodide hexafluorophosphate, diphenyl iodide hexafluoroarsenate, diphenyl iodide hexafluoroantimonate, diphenyl p-methoxyphenylsulfonium triflate, diphenyl p-
5 toluenylsulfonium triflate, diphenyl p-isobutylphenylsulfonium triflate, diphenyl p-tert-butylphenylsulfonium triflate, triphenylsulfonium hexafluorophosphate, triphenylsulfonium hexafluoroarsenate, triphenylsulfonium hexafluoroantimonate, triphenylsulfonium triflate, dibutyl-naphthylsulfonium triflate, phthalimidotrifluoromethane sulfonate, dinitrobenzyltosylate, n-decyl disulfone and
10 naphthylimido trifluoromethane sulfonate.

15. The photoresist composition according to claim 6, wherein the photoacid generator is present in an amount ranging from 1 to 10 wt% to the base resin.

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16. The photoresist composition according to claim 6, wherein the organic solvent is selected from the group consisting of methyl 3-methoxypropionate, ethyl 3-ethoxypropionate, propyleneglycol methyletheracetate, cyclohexanone, 2-heptanone, ethyllactate and mixtures thereof.

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17. The photoresist composition according to claim 6, wherein the organic solvent is present in an amount ranging from 700 to 4000 wt% to the base resin.

25 18. A process for forming a photoresist pattern comprising:
(a) coating the photoresist composition of claim 6 on an underlying layer to form a photoresist film;
(b) exposing the photoresist film to light; and
(c) developing the resulting structure to obtain a photoresist pattern.

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19. The process according to claim 18, further comprising soft baking before part (b) or post baking after part (b).

20. The process according to claim 18, wherein the source of the light is selected from the group consisting of EUV, KrF, ArF, VUV, E-beam, X-ray and ion beam.

5 21. A semiconductor device manufactured according to the process of claim 18.